Alg. 2 Warm Up #2-1

Solve:

1) $|2x - 7| > 23$

2) $\frac{3}{4}|x + 5| - 6 < 9$

3) Simplify:

a) $(5x^{-3}y)^{-2}$

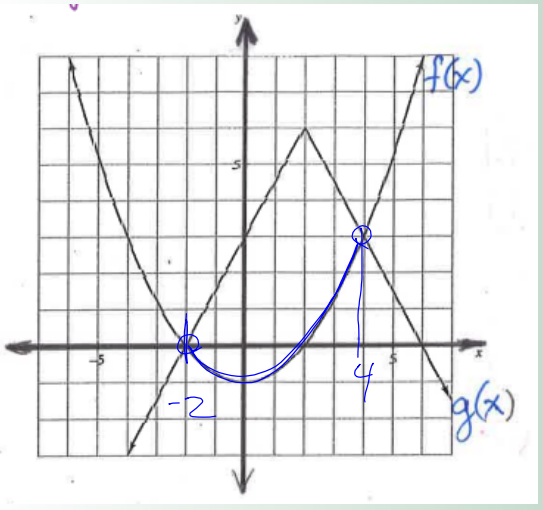
b) $4x^{7} \cdot (-2x^{8})^{-3}$

HW Questions, green WS:

1) Parent: $y = x^2$ & $y = |x|$

2) $f(x) \rightarrow$ vertical compression of $\frac{1}{4}$
down 1
$f(x) = \frac{1}{4}x^2 - 1$

3) $g(x) \longrightarrow$ reflection over the x-axis
vertical stretch $\frac{3}{2}$
R+ 2, up 6
$g(x) = -\frac{3}{2}|x - 2| + 6$



8) a) $f(x) < g(x)$

$\frac{1}{4}x^2 - 1 < \frac{3}{2}|x-2| + 6$

$-2 < x < 4$

11c) $\left(\frac{3x}{4x^{10}}\right)^{-2}$

$\left(\frac{4x^{10}}{3x}\right)^{2}$

$\left(\frac{4x^{9}}{3}\right)^{2}$

$\frac{16x^{18}}{9}$

11d) $(4x)^{-2} \cdot x^7 y^2$

$\left(\frac{1}{4x}\right)^{2} \cdot x^7 y^2$

$\frac{1}{16x^2} \cdot \frac{x^7 y^2}{1}$

$\frac{x^5 y^2}{16}$

Magic Trick

Chapter 5 Inverses and Logarithms

In Chapter 4, one of the strategies that you used to solve complicated equations was Undoing. In this chapter you investigate some new functions that "undo" each other. You will learn about inverse relationships and investigate the relationships between functions and their inverses. You will also learn about compositions of functions.

In Section 5.2, you will find the inverses of many parent graphs and add them to the tools you have for working with parent graphs. You will find inverses for exponential functions, which are called logarithmic functions. You will then investigate this family of functions and transform its graphs.

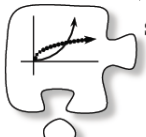
Guiding Question

Mathematically proficient students look for and make use of structure.

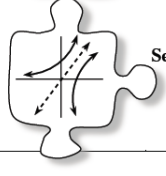
As you work through this chapter, ask yourself:

How can I use the reflective nature of inverse graphs to find the equations for inverses?

Chapter Outline



Section 5.1 You will examine relationships, called inverses, that "undo" the actions of functions. You will also learn how to create composite functions by "stacking" function machines, and you will investigate what happens when you compose functions and their inverses.



Section 5.2 You will be introduced to an important new family of functions, called logarithms, which are the inverses of exponential functions. You will investigate this family and learn to transform its graphs.

CP's: 5- #1 --->5

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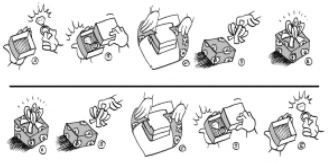
5.1.1 How can I "undo" a function?

"Undo" Equations

Have you ever heard the expression, "She knows it forward and backward," to describe someone who understands an idea deeply? Often, being able to reverse a process is a way to show how thoroughly you understand it. Today you will reverse mathematical processes, including functions. As you work today, keep these questions in mind:

How can I "undo" it?

How can I justify each step?



5-1. GUESS MY NUMBER

Today you will play the "Guess My Number" game. Your teacher will think of a number and tell you some information about that number. You will try to determine your teacher's number. (You can use your calculator or paper if it helps.) When you think you know the number, sit silently and do not tell anyone! Be sure to give others a chance to figure it out!

For example your teacher might say: *"When I add 4 to my number and then multiply the sum by 10, I get –70. What is my number?"*

Your task will be to find the number and explain your reasoning.

5- 1

I'm thinking of a number that…

when I…	*I get…*	
• triple my number and • add four	ten	2
• double my number • add four and • divide by two	five	3
• square my number • add three • divide by two and • add one	seven	3 ± -3 Strategy: you could work backwards from 7→ 7-1=6, 6(2)=12, 12-3=9, $\sqrt{9}=\pm 3$
• double my number • subtract six • take the square root and • add four	eight	Strategy: Let x = my number. $\sqrt{2x-6}+4=8$ then solve!

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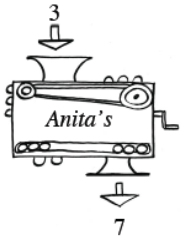
5-2. A picture of Anita's function machine is shown at right. When she put 3 into the machine, 7 came out. When she put in 4, 9 came out, and when she put in –3, –5 came out.



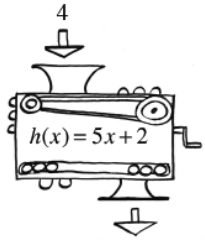
a. Make a table to organize the inputs and outputs from Anita's function machine. Explain in words what this machine is doing to the input to generate an output.

b. Anita's function machine suddenly started working backwards: it began pulling outputs back up into the machine, reversing the machine's process, and returning the original input. If 7 is pulled back into this machine, what value do you think will come out of the top? Anita sets up her new backwards function machine and enters the other outputs. What would you expect to come out the top if 9 is entered? If –5 is entered? Explain.

c. Record the inputs and outputs of the backwards function machine in a table. Record the numbers going in as x, and the numbers coming out as y. Explain in words what Anita's backwards function machine is doing.

d. Write equations for Anita's original function machine and for her backwards machine. How are the two equations related?

5-3. The function machine at right follows the equation $h(x) = 5x + 2$.



a. If the crank is turned backwards, what number should be pulled up into the machine in order to have a 4 come out of the top?

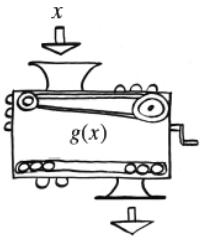
b. Keiko wants to build a new machine that will undo what $h(x)$ does to an input. What must Keiko's machine do to 17 to undo it and return a value of 3?

c. An "undo" function is called an **inverse** and has the notation $h^{-1}(x)$. Note that the –1 is not a negative exponent. It is the mathematical symbol that indicates the inverse function of $h(x)$. Write an equation for $h^{-1}(x)$, the "undo" function machine.

d. Choose a value for x. Then find a strategy to show that your equation, $h^{-1}(x)$, undoes the effects of the function machine $h(x)$.

5-4. Keiko was working with a new function, $g(x)$. He wrote down the following steps for $g(x)$:

- Add 5.
- Divide by 2.
- Cube it. (Find the third power.)
- Multiply by 6.



a. What is the equation for $g(x)$? What is the output when 3 is put in?

b. Help Keiko write down the steps (in words) of the inverse machine, $g^{-1}(x)$, and then write its equation.

c. Verify that your equation in part (b) correctly "undoes" the output of $g(x)$ in part (a).

5-5. Find the inverse equations for each of the functions below. Use function notation. Justify that each inverse equation works for its function.

a. $f(x) = 3x - 6$

b. $g(x) = x^3 - 5$

c. $p(x) = 2(x+3)^3$

d. $t(x) = \frac{10(x-4)}{3}$

December 11, 2017

HW Heading:

5- # 8 ---> 15

Name
Per Team #

Show your work

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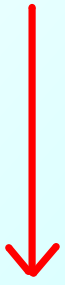

not across.

8a.

b.

9a.